Leonardo da Vinci

by Diane Stanley

As an inventor, Leonardo is probably most famous for having tried to build a flying machine. He was convinced that "the bird is an instrument functioning according to mathematical laws, and man has the power to reproduce an instrument like this with all its movements." So he analyzed the flight patterns of birds and bats, studied the anatomy of their wings, and observed air currents.
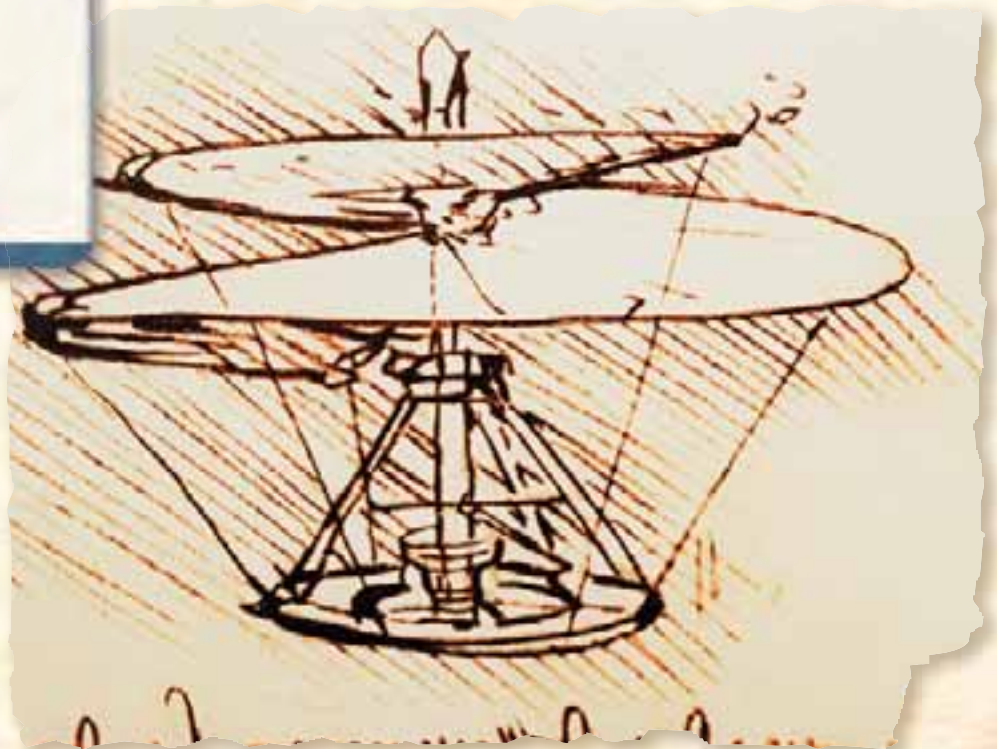
Leonardo da Vinci wrote, "I believe that if this screw device is well manufactured, that is, if it is made of linen cloth, the pores of which have been closed with starch, and if the device is promptly reversed, the screw will engage its gear when in the air and it will rise up on high."

616

Drawings of *Parachute Experiments and Flying Machines* by Leonardo da Vinci

He sketched a variety of designs and finally, after years of preparation, built a model in a secret upstairs room at his workshop. On January 2, 1496, he wrote in his notebook, "Tomorrow morning, I shall make the strap and the attempt." Either he lost his nerve or it didn't work. At any rate, we have no record of it. But the next time he wrote of trying to fly, he was more cautious. "You will experiment with this machine over a lake," he wrote to himself, "and you will wear attached to your belt a long wineskin . . . so that if you fall in, you will not be drowned."

Model of airscrew built after sketch by Leonardo da Vinci

In 1503 he felt certain of success. Twice he wrote about it in his notebook, speculating grandly that the flight would dumbfound the universe and bring him eternal glory. Yet after years of work and study, Leonardo failed. We don't know any of the details, but much later the son of one of Leonardo's friends wrote these words about the attempt: "Vinci tried in vain."

At least he finally understood the problem. Birds are designed to fly—half the weight of their bodies is in the muscles of flight. Humans, on the other hand, with less than a quarter of their body weight in the arm and chest muscles, would never have the strength to fly like birds.

In his notes, Leonardo remarked that with this linen parachute, if it is held open, a person can jump without risk.

As a casual afterthought he designed a parachute as well as an airscrew, based on a toy, which some call the first helicopter. He also sketched the pattern of a leaf drifting to earth and under it showed a man on a winglike **glider**. If he had only worked along these lines instead of trying to imitate the flapping motion of birds, he might have been the first man to fly.

Model of parachute built after sketch by Leonardo da Vinci

Connect and Compare

1. How does the reader learn more about Leonardo da Vinci from his notebook entries and drawings? **Primary Source**

2. How does reading Leonardo da Vinci's own words help you understand his ideas and feelings? **Apply**

3. The notebook entries and *Leonardo's Horse* introduce you to Leonardo da Vinci. Which piece helped you get to "know" him better? Why? **Reading/Writing Across Texts**

Social Studies Activity

Research other great minds from the Italian Renaissance. Select one and write a summary of this person's greatest innovation. Did this person keep a journal?

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Write About How to Make Something

I used the time-order words *first*, *then*, *next*, and *finally*.

I used the position word *top*.

How to Make a Wax-Press Leaf Collage

by Dorothy B.

You can bring the outdoors indoors with a leaf collage. It is easy to make one, with a little adult supervision.

Begin by collecting leaves, a large piece of cardboard, two pieces of wax paper, glitter, and a dry rag. You'll also need an iron to press the leaves between the wax paper.

First, cover your work area with the cardboard. Make sure you cover it well. Plug in the iron and set it on its end on a safe surface nearby. Then, on top of the cardboard, arrange the leaves on one piece of wax paper. Sprinkle on some glitter. When you are satisfied with your arrangement, cover it with the other piece of wax paper to make a "sandwich."

Next, cover the wax paper sandwich with the dry rag. Iron slowly over the rag. This will melt the wax paper and trap the leaves and glitter in place.

Finally, after you have ironed the wax paper well, gently remove the rag. Remember to unplug the iron! Transfer the collage to a flat surface while it cools. You can add trim around the wax paper to make a border if you like.

Your Turn

Think of something that you know how to make. Then write the steps for how to make it. Be sure to give the steps in order and to use signal words such as *first, next*, and *then* to help your reader follow your directions. Use the Writer's Checklist to check your writing.

Writer's Checklist

✓ **Ideas and Content:** Did I pick a project that I can explain clearly? Are my directions concise?

✓ **Organization:** Did I give the steps in the correct order? Did I give enough details to help the reader understand what to do?

✓ **Voice:** Can the reader tell that I am talking right to them?

☐ **Word Choice:** Did I use **time-order words** and position words?

✓ **Sentence Fluency:** Do the beginnings of my sentences vary and show how my ideas connect?

✓ **Conventions:** Did I use correct spelling and punctuation? Did I use *good* and *well* correctly in my sentences?